Dr. Maria (Masha) Okounkova

Curriculum Vitae

Flatiron Institute
SXS collaboration, LIGO Scientific Collaboration
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I am a Flatiron Research Fellow at the Center for Computational Astrophysics at Simons Foundation Flatiron Institute in New York City. My research is in numerical relativity, and I am interested in using numerical relativity to test general relativity through gravitational wave observations. Specifically, I work on producing full numerical-relativity gravitational waveforms in theories beyond general relativity. I am a member of the Simulating Extreme Spacetimes (SXS) collaboration and the LIGO Scientific Collaboration (LSC).

Scientific interests

Numerical relativity, binary black hole simulations, binary black hole simulations in theories beyond general relativity, theories of gravity beyond general relativity determining the start time of binary black hole ringdown, black hole shadows, code development for numerical relativity, testing general relativity with gravitational wave observations

Academic positions

Flatiron Institute Center for Computational Astrophysics (CCA)
Flatiron Research Fellow (since 2019)
Member of Gravitational Waves and Compact Objects groups

Education

California Institute of Technology (Caltech) PhD in physics, (2014 - 2019)
advised by **Saul Teukolsky**

Princeton University B.A in physics, *magna cum laude* (2010 - 2014)
certificate in applications of computing

Selected Publications

Maria Okounkova, Leo C. Stein, Jordan Moxon, Mark A. Scheel, and Saul A. Teukolsky. *Numerical relativity simulation of GW150914 beyond general relativity.* arXiv:1911.02588 Submitted to Phys. Rev. D., Nov 2019

Maria Okounkova. *Stability of rotating black holes in Einstein dilaton Gauss-Bonnet gravity.* arXiv:1909.12251 Accepted to Phys. Rev. D., September 2019

Maria Okounkova, Leo C. Stein, Mark A. Scheel, and Saul A. Teukolsky. *Numerical binary black hole collisions in dynamical Chern-Simons gravity.* Phys. Rev. D 100:104026, Nov 2019

Michael Boyle et al. (inc **Maria Okounkova**), *The SXS Collaboration catalog of binary black hole simulations* Class. Quant. Grav., April 2019

Maria Okounkova, Mark A. Scheel, and Saul A. Teukolsky. *Evolving Metric Perturbations in dynamical Chern-Simons Gravity.* Phys. Rev. D 99:044019, Feb 2019

Maria Okounkova, Mark A. Scheel, and Saul A. Teukolsky. *Numerical black hole initial data and shadows in dynamical Chern-Simons gravity.* Class. Quant. Grav., Feb 2019

Swetha Bhagwat, **Maria Okounkova**, Stefan W. Ballmer, Duncan A. Brown, Matthew Giesler, Mark A. Scheel, and Saul A. Teukolsky. *On choosing the start time of binary black hole ringdowns.* Phys. Rev. D 97:104065, May 2018.

Maria Okounkova, Leo C. Stein, Mark A. Scheel, and Daniel A. Hemberger. *Numerical binary black hole mergers in dynamical Chern-Simons gravity: Scalar field.* Phys. Rev. D 96:044020, Aug 2017.

Invited talks

CCPP Astro Seminar, *Binary black holes beyond general relativity*, NYU (October 2019)

Astro Seminar, *Binary black holes beyond general relativity*, Stony Brook University (October 2019)

Gravity Lunch Seminar, *Binary black holes beyond general relativity*, Cornell University (December 2018)

Invited Seminar, *Binary black holes beyond general relativity*, UT Austin (November 2018)

Princeton Gravity Initiative Lunch Seminar, *Numerical black holes in dynamical Chern-Simons gravity*, Princeton University (November 2018)

Strong Gravity Seminar, *Numerical black holes in dynamical Chern-Simons gravity*, Perimeter Institute (September 2018)

GWPAC High Performance Computing Workshop, *Determining the start time of binary black hole ringdown*, Cal State Fullerton (August 2018)

Forefronts in Cosmology and Numerical General Relativity, *Numerical binary black hole mergers in dynamical Chern-Simons gravity*, Simons Summer Workshop (July 2018)

Numerical Relativity beyond General Relativity workshop, *Numerical black holes in dynamical Chern-Simons gravity*, Centro de Ciencias de Benasque (June 2018)

TAPIR seminar, *Determining the start time of binary black hole ringdown*, Caltech (April 2018)

LIGO Seminar, *Numerical binary black hole mergers in dynamical Chern-Simons gravity*, Caltech (December 2017)

Honors

Kip Thorne Prize for Excellence in Theoretical Physics, Caltech (June 2019)

John Stager Stemple Memorial Prize for best performance on oral candidacy exam and research progress, Caltech (June 2018)

APS DGRAV best student talk at PCGM34, Caltech (March 2018)

Oculus Prize and **Amazon Prize**, Maestro team, Hack Music LA (2017)

Dominic Orr Graduate Fellowship, Caltech, (2014-2016)

Hartle Award for best talk in numerical relativity session, GR21 conference (July 2016)

Best student talk at TASC (Theoretical Astrophysics in Southern California) conference, Cal State Fullerton (November 2015)

Kusaka Memorial Prize in Physics (top graduating seniors in physics), Princeton University (2014)

Allen G. Shenstone Prize in Physics (top juniors in physics), Princeton University (2013)

Teaching and mentorship

Teaching assistant, computational physics sequence (Ph20: Introduction to the Tools of Scientific Computing, Ph21: Tools for Data Analysis, Ph 22: Tools for Numerical Methods), Caltech (2016-2017)

Caltech SURF mentor, mentored Caltech undergraduate Nicholas Meyer in numerical relativity (Summer 2016)

Laboratory teaching assistant, computer science sequence (COS 126: Introduction to Computer Science, COS 217: Introduction to Programming Systems, COS 226: Algorithms and Data Structure), Princeton University (2012-2014)

Service

Executive committee member, SXS Collaboration

Student-Postdoc Advocate, SXS Collaboration

Conference organizer, Pacific Coast Gravity Meeting (PCGM) 34, Caltech

Organizing committee member, Caltech/JPL Association for Gravitational-Wave Research (2017-)

Ocsi Bacsi, *organized graduate student seminar lunch and events for the TAPIR group*, Caltech (2016-2017)

Numerical relativity group leader, *gave talks teaching graduate students about numerical relativity*, Caltech TAPIR, (2015-2016)

Outreach

I regularly participate in community science nights at local schools, as well as astronomy outreach events including Astronomy on Tap. For an example of my public outreach talks, please see a lecture on computational physics I gave to the general public at Caltech.

References

Prof. Saul Teukolsky
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Research Prof. Mark Scheel
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Asst. Professor Leo Stein
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Prof. Will Farr
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